

Claim 1 (original): A method of enhancing the bioactivity of a substrate comprising the steps of applying to the surface of the substrate inorganic material comprising calcium phosphate containing compounds using relatively low temperature and bombarding the applied inorganic material into the substrate using inert ions forming an alloy of the substrate material and the inorganic material.

Claim 2 (original): A method according to claim 1 in which the inorganic material is applied by sputtering.

Claim 3 (original): A method according to claim 2 in which the inorganic material is embedded into the substrate surface a distance of up to 5000 angstroms.

A1
Claim 4 (currently amended): A method according to claim 3 in which the substrate is formed of one of ~~C.P.~~ commercially pure titanium and titanium alloy.

Claim 5 (original): A method according to claim 3 in which the substrate is formed of resin.

Claim 6 (original): A method according to claim 3 in which the substrate is formed of resin.

Claim 7 (original): A method according to claim 3 in which the inorganic material is hydroxylapatite.

Claim 8 (original): A method according to claim 7 further comprising the step of applying an additional layer of hydroxylapatite to the alloy while continuously bombarding the additional layer with an augmenting beam.

Claim 9 (original): A method according to claim 8 in which the additional layer of hydroxylapatite is between approximately 500 and 10,000 angstroms thick.

Claim 10 (original): An article made according to the method of claim 3.

Claim 11 (original): A dental implant made according to the method of claim 4.

Claim 12 (original): An orthopedic implant made according to the method of

claim 4.

A1
Cont'd

013.1

In accordance with the invention, an orthopedic or dental prosthetic implant is provided with a surface layer having a bioactive apatitic attribute permitting bone to bond directly and tenaciously to the implant. A preferred substrate material is commercially pure (hereinafter also referred to as C.P.) titanium or a titanium alloy such as Ti6Al4V and an implant made in accordance with the invention has a bioactive apatitic titanium alloy (BATA) surface. However, other biocompatible implant material substrates can be used, such as other metals, ceramic and plastic. Alloy is used in the sense defined in Merriam-Webster's Collegiate Dictionary of a compound, mixture, or union of different things. Application parameters can vary the ratio of HA or other substances embedded into the surface microstructure of the implant substrate. Further, the alloyed substrate surface, for example apatitic titanium, can be overlaid with an HA surface layer alloyed thereto. It is also within the purview of the invention to alloy other substances, alone or in combination, to alter or otherwise enhance the bioactive attributes and load transmitting abilities of the implant.
